In the Matter of	**)**	
	)	
Amendment of Part 2 of the Commission's Rules	**)**	
to Allocate Spectrum Below 3 GHz for Mobile	**)**	**ET Docket No. 00-258**
and Fixed Services to Support the Introduction of	**)**	
New Advanced Wireless Services, including Third	**)**	
Generation Wireless Systems	**)**	
	)	

PETITION
OF
AMERICAN NATIONAL STANDARDS INSTITUTE
ACCREDITED STANDARDS COMMITTEE C63 (EMC)
SUBCOMMITTEE 7 (UPCS)
ANSI ASC C63 SC7

American National Standards Institute Accredited Standards Committee C63 (ANSI ASC C63) for ElectroMagnetic Compatibility (EMC) Subcommittee 7 (Unlicensed Personal Communications Services) (SC7) hereby presents a petition to the FCC (Commission) requesting that the upper monitoring threshold, contained in 47CFR15.323 (c)(5) be increased from 50 dB above thermal noise to 65 dB above thermal noise. Thus this petition requests that the first sentence of 47CFR15.323 (c)(5), which currently reads:

> *(5) If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed. …*

Would be revised to read:

> *(5) If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 65 dB above the thermal noise power determined for the emission bandwidth may be accessed. …*

During the course of its work the ANSI ASC C63 SC7 committee has come to believe that the current monitoring threshold value of 50 dB was arrived at through an analysis which optimized for distance or range. However, while some use scenarios should be optimized for distance, in other use scenarios it is preferable to subordinate range for density of devices. In other usage scenarios it is preferable that a number of devices are able to operate in close proximity and density of devices is preferable to range. The change in this monitoring threshold from 50 to 65 dB would allow manufacturers to optimize their devices for distance or range, as best suits the needs of their users.

A second reason for changing this value is to prepare the UPCS band for widespread use of the PCS H-Block AWS service (1915 – 1920 MHz). The committee's analysis reveals that with the current "upper threshold" a single PCS H-Block device could block the entire UPCS band in its vicinity.

Background

Subcommittee 7 (UPCS) of ANSI ASC C63 is responsible for the development and maintenance of UPCS EMC and etiquette standards, including ANSI C63.17 which was developed by SC 7 and first published in 1998. ANSI C63.17 has been adopted by the FCC to provide the test methodology for 47CFR15 Subpart D.[1] In the fall of 2004, in response to the FCC revision of the rules for the UPCS band[2], SC7 began to revise ANSI C63.17 to reflect changes to 47CFR15 Subpart D and other needed revisions to the document. During the course of its work the committee identified what it believes is a better value for the limit ANSI C63.17 calls the "upper threshold", which is contained in 47CFR15.323(c)(5). The value of this "upper

1 47CFR15.31(a)(2)
Unlicensed Personal Communication Service (UPCS) devices are to be measured for compliance using ANSI C63.17-1998: "Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices", (incorporated by reference, see § 15.38). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51.

2 FCC 04-219

threshold" is currently 50 dB above thermal noise. The analysis of the committee is that the current value is entirely suitable if the usage of UPCS devices is in relatively sparse usage environments where range is the primary factor.

There are however situations where it is desirable to have a number of UPCS devices operating in close proximity. Examples of such operating environments would be a cubicle (partitions between offices do not fully extend to the ceiling of the building) office environment where every cubicle might have a UPCS device in it. Under the current rules the committee believes only one UPCS device in every four cubicles could be used simultaneously. Under its proposed value of 65 dB, the committee believes that a UPCS device could be operated simultaneously in every cubicle, in a typical cubicle partition environment. In such a scenario each device would lose range due to the density of spectral use. However, in such dense systems it is common practice to install a system in which devices may operating a short distance from the nearest base station, and in this way the loss of range has little if any.

Technical Analysis

Background

UPCS equipment is only allowed to transmit if the interference is less than a threshold defined in the FCC part 15.323 rules. There are two thresholds defined in the FCC rules for the UPCS band, a "lower threshold" (thermal noise floor, TN, + 30 dB), and an "upper threshold" (TN + 50 dB). The "upper threshold" only applies to equipment which has more than 40 system access channels and which implements the Least Interfered Channel, LIC, selection procedure.

Interference Levels from Future AWS Devices

The critical interference scenario to evaluate for UPCS equipment is the interference created by UPCS equipment or H-Block (1915 – 1920 MHz) devices which are used in the same

local indoor environment. Typical environments are offices, factories and homes. In these common environments devices are within 1-10 meters, typically within 1-5 m.

The permitted out-of-band transmit power from an H-block PCS handset is currently -13 dBm/MHz within the band 1921-1930 MHz. Interference level can be expressed as equivalent level above Thermal Noise floor, TN. TN is -114 dBm for 1 MHz bandwidth. Thus -13 dBm/MHz can be expressed as TN + 101 dB.

Within the band 1920-1921 MHz the allowed out-of-block transmit power from an H-block PCS handset is -13 dBm/1% of B, where B is the bandwidth of the PCS handset transmission. If B = 1.25 MHz (as for CDMA 2000), the allowed interference becomes -13 dBm/12.5 kHz. TN is -133 for 12.5 kHz. Thus -13 dBm/12.5 kHz can be expressed as TN + 120 dB.

Assuming free space propagation, the attenuation at 1 m, 3.2 m and 10 m is about 38 dB, 48 dB and 58 dB, respectively, for UPCS band frequencies. Table 1 gives the interference levels into the UPCS band.

The interference power is expressed as equivalent level above Thermal Noise floor, TN, for a PCS transmitter with an out-of-band emission power of -13 dBm/12.5kHz within 1920 – 1921 MHz and -13 dBm/MHz within 1921 – 1930 MHz.

Part of the UPCS band	Separation distance between PCS handsets and UPCS equipment		
	1 m	3.2 m	10 m
1920 – 1921 MHz	TN + 82 dB	TN + 72 dB	TN + 62 dB
1921 – 1930 MHz	TN + 63 dB	TN + 53 dB	TN + 43 dB

Table 1. Interfering power at different separation distances

Analysis of the "Upper Threshold"

Reviewing the interference levels of Table 1 we find:

a) Equipment using the lower threshold is not at all feasible for use.
b) Equipment using LIC (the upper threshold) is feasible for use, but the upper threshold must be increased at by 15 dB, to assure that one active H-block device would not block the whole UPCS band for a base station or a handset.

As can be seen in Table 1, only at a distance of 10 m and in the frequency block 1921 – 1930 MHz is the interference from a single H-Block transmitter under the current "upper threshold" limit of TN + 50 dB! A change to the value recommended in this petition of TN + 65 dB would allow use of UPCS with H-Block devices in close proximity.

UPCS equipment has the potential to avoid the most interfered channels by using the "Least Interfered Channel", LIC, procedure. Assuming the UPCS equipment would move away from the 1920 – 1921 MHz area when an H-Block device is operating, the analysis can be limited to the main 1921– 1930 MHz band, where the potential interference levels are lower than within 1920–1921 MHz.

The interference levels within 1921-1930 MHz, have however the potential to block the whole band due to the current low UPCS "upper threshold"! Hence, the conclusion of the committee is that it is advisable to change the "upper threshold" to TN + 65 dB in anticipation of the deployment of H-Block devices in the near future. **Thus, having an upper threshold of "thermal noise floor + 65 dBm" would free at least the 1921 – 1930 MHz for intended UPCS** use.

Increased Utilization of the UPCS band

A second reason for increasing the UPCS "upper threshold" is to make the band available in more usage scenarios.

Simulations show that for high traffic density open areas (e.g. large office landscapes and exhibition halls with close to free space propagation) the present "upper threshold" limit constricts the utility of the UPCS band. Figure 1 below is a simulation of a system covering a 3 floor 100x100 m building. There are 25 equally spaced base stations on each floor (20 m base

station separation). The system has 120 duplex access channels (10 carriers with 12 duplex channels each) on a 20 MHz spectrum allocation. Moving portables, intra-cell and inter-cell handover is included in the simulation.

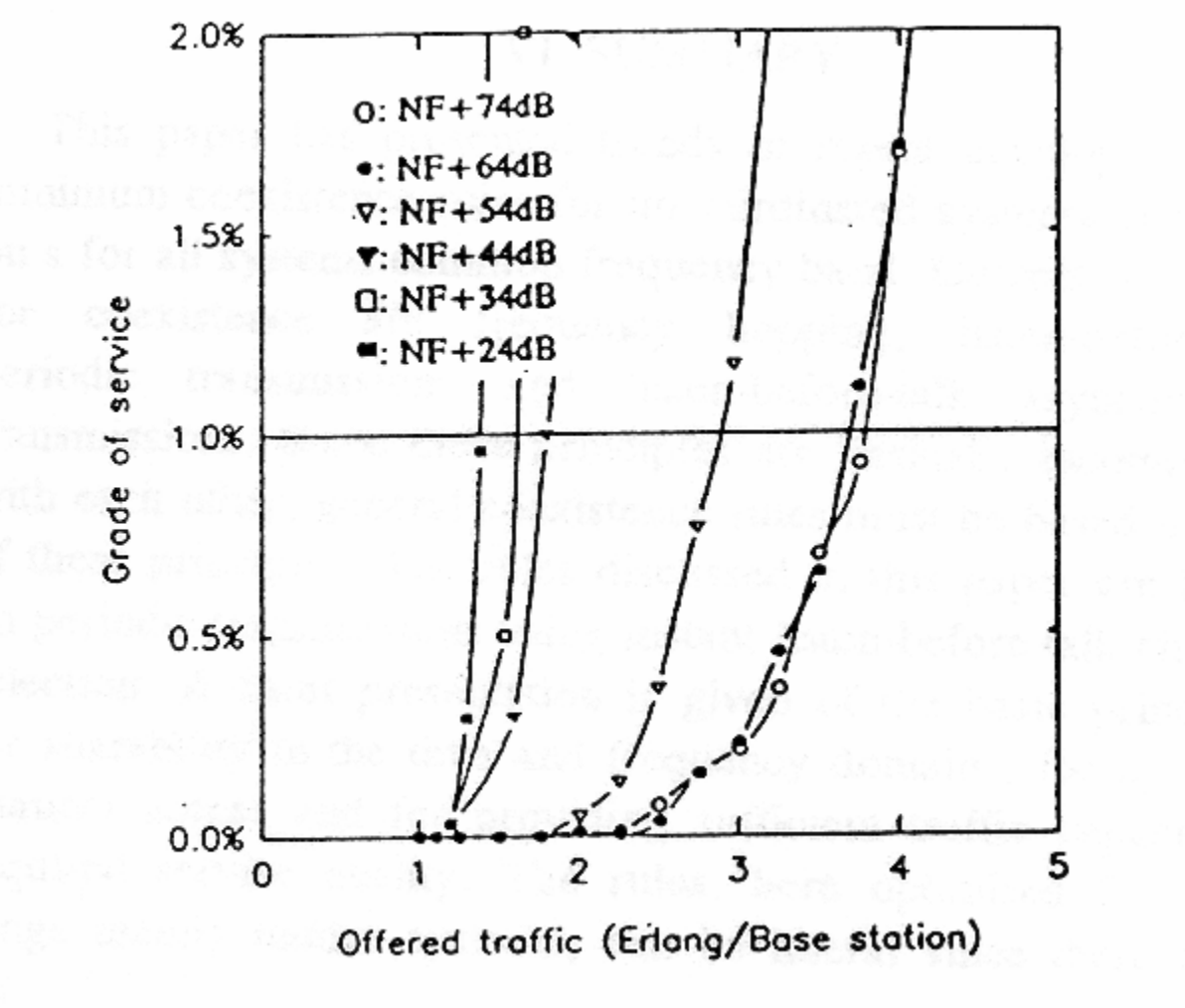

Figure 1 - Capacity as function of the UPCS upper threshold limit.
Free space model of 120 system access channels

Figure 1 shows that for this specific simulation, the capacity (1 % grade of service limit) the system capacity would increase by at least 60% if the upper threshold is changed from TN + 50 dB to TN + 65 dB.

For the UPCS band only 10 MHz and 60 access channels are available. In this case it is

even more important that an appropriate “upper threshold” be used. If the “upper threshold” is too low it will restrict use of channels that are perfectly useful for communication. In dense usage environments there would be a loss of range. However, range in such environments is not the critical component and is typically compensated for by providing additional base stations to service the area.

Thus, having an upper threshold of “thermal noise floor + 65 dBm” would considerably increase the utilization (+60 %) of the UPCS band and decrease infrastructure costs for high capacity installations.

Conclusion

The present “upper threshold” is too low. When the AWS H-Block begins to be actively used a single H-Block device may block the entire UPCS band with the current “upper threshold”. Further, the current level effectively prevents using the band in dense usage scenarios, which otherwise could be effectively serviced by UPCS devices. The utilization of the UPCS band is limited to 60 % less than its potential. The upper limit should be increased to TN + 65 dB.

Because it believes it has identified a useful improvement of the monitoring threshold contained in 47CFR15.323(c)(5) ANSI ASC C63 SC7 is pleased to present this petition to the FCC and looks forward to continued dialogue with the Commission as it seeks to support and optimize the utility of the UPCS band.

Respectfully submitted,

ANSI ASC C63 SC7

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